

Golden State

FLOODLIGHT

California Floodplain Management Newsletter

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Santa Clara Valley Water District Multi-Objective Management Garner Community Support

By Jim McCann

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A bank stabilization project, using log crib walling as a biotech solution.

The Santa Clara Valley Water District manages flood protection programs for the entire Santa Clara County, including the center of high technology innovation - the fabled Silicon Valley. It should be no surprise, then, that the water district is itself an innovative leader in floodplain management.

The district's board of directors took the bold step in the late 1990's to embrace among its guiding principles natural flood protection, habitat preservation and wise environmental stewardship.

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From the passage of a community-supported parcel tax for natural flood protection projects to the successful acquisition of long-term 10-year routine stream maintenance permits, the district continues to explore ways to succeed with cost-effective, environmentally-sensitive watershed stewardship in times of tightening budgets and funding challenges. So how did the SCVWD achieve success?

Trusting voters tax themselves

In November 2000, more than 2/3 of the county's voters agreed to provide funding to the water district for a 15-year effort to reduce flood hazards as well as protect and restore hundreds of miles of waterways in Santa Clara County.

An important aspect of the \$25-million-a-year Clean, Safe Creeks and Natural Flood Protection program was formation of an external and independent monitoring committee. The committee held its inaugural meeting in April 2002 and provided its first annual report of the program in Feb. 2003. Among program outcomes the committee is monitoring is flood protection for homes, schools, businesses and transportation networks in the county. Over the next 15 years, the district plans to construct nine new flood protection projects to safeguard 13,600 homes, 1,040 businesses, and 43 schools and public facilities in the county. The first report provided an excellent "grade" for progress made to date.

In addition to flood protection, the Clean, Safe Creeks program is also designed to protect, enhance and restore creek ecosystems, improve water quality, help keep neighborhood creeks free from trash and develop 70 miles of trails along creeks in the county.

Protecting property, preserving habitat

After a six-year hiatus, construction resumed in 2002 on the \$242 million Guadalupe River Park and Flood Protection project in downtown San Jose, demonstrating that collaboration and cooperation can lead to creative solutions.

The project was designed to combine effective flood protection with habitat enhancement and restoration, as well as recreation in an urban area. Although first authorized in 1986, construction of the project did not begin until 1992, when federal construction funds were first approved. The first

two phases of the project were completed by 1996 when work halted due to concerns about the anticipated listing of steelhead trout and Chinook salmon as endangered species. To resolve the complex issues of providing suitable habitat for threatened species, while meeting the critical flood control needs of the community, the water district, the City of San Jose, the San Jose Redevelopment Agency and the Corps of Engineers invited natural resource agencies, state and local water resource agencies and the potential litigants to reformulate the project.

The revised plan not only provides flood protection but also enhances the stream for fish and wildlife, and improves the quality of water flowing through the Guadalupe. The flood-protection portion of construction is scheduled for completion by November 2004, while work on the river park is to be completed by December 2005.

After touring the project, an editorial in the San Jose Mercury News said, "At a time when government bashing is an overplayed sport, the Guadalupe flood-control, river-restoration project is a great example of how government can get it right."

10-year routine stream maintenance permit will provide long-term benefits

The multi-year stream maintenance program allows the district to continue removing sediment and debris from creeks, manage vegetation growth in stream channels, repair erosion along banks and conduct minor maintenance activities annually for the next decade without having to submit time-consuming permit applications to as many as six federal and state regulators each year.

The program, a culmination of five years of negotiations with federal and state regulatory agencies, was launched in September 2002, following the receipt of the final permit from the U.S. Army Corps of Engineers. The district also received multi-year permits from the state Department of Fish and Game, U.S. Fish and Wildlife Service and National Marine Fisheries Service, as well as Regional Water Quality Control Boards serving the San Francisco Bay Area and Central Coast regions of California.



The end result of a project which removed a barrier to fish passage, and now encourages the native Chinook salmon and steelhead trout in their migration to spawning grounds further upstream on the Guadalupe River in Santa Clara County.

“This 10-year program is an example of the way business should be done in the regulatory arena. It’s also an example of the ‘new environmentalism’ that focuses on consultation, communication and cooperation – all in the service of conservation,” said Craig Manson, assistant secretary of the interior for Fish, Wildlife and Parks.

Watershed philosophy is key

Official board policy now states: The District is a steward of the watersheds in Santa Clara County, the streams and the natural resources therein, and will strive to ensure their benefits to the community’s quality of life are protected and when appropriate, enhanced or restored.

Not only has the district changed its internal policies to reflect a broader conception of “comprehensive water management” in the watershed context, the district’s board also sponsored a bill to amend the District Act to explicitly provide legislative authority and direction to carry out environmental work along with and consistent with our original core missions of water supply and flood protection. This action codified the change and evolution from flood management of the past to the watershed-oriented values incorporated into our work today.

The Santa Clara Valley Water District is the primary water resources agency for the nearly 1.8 million residents of Santa Clara County, California. The district makes sure there is enough clean, safe water for homes and businesses, works to protect Santa Clara County residents and businesses from the devastating effects of flooding, and is the environmental steward for the county’s streams and creeks, underground aquifers and district-built reservoirs.

For questions or further information about this article, please contact Jim McCann by email jmccann@valleywater.org or phone 408-265-2607X2420; or Sara Duckler by email sduckler@valleywater.org or phone 408-265-2607x2432.

Regional Director, FEMA Region IX

Appointed by President

Joe M. Allbaugh, former director of the Federal Emergency Management Agency (FEMA) announced on Nov. 21, 2002 that Jeff Griffin, the former mayor of Reno, Nevada, was appointed by the President as



Jeff Griffin
*Regional Director,
FEMA Region IX*

regional director of FEMA Region IX, based in Oakland, Calif. (NOTE: See address correction below). As regional director, Mr. Griffin is responsible for administering federal emergency preparedness, mitigation, and disaster response and recovery programs for the states of Arizona,

California, Hawaii and Nevada, as well as the Territory of American Samoa, the Territory of Guam, the Commonwealth of the Northern Mariana Islands, the Republic of the Marshall Islands and the Federated States of Micronesia.

Mr. Griffin brings crucial government and private industry experience at the state and local level to his new assignment, experience that is increasingly important as federal agencies work closely with localities to prepare for national security emergencies.

Before joining FEMA, Griffin served two terms in 1995 and 1998 as mayor of Reno, Nevada. Prior to that, Griffin enjoyed a 28-year business career during which he founded and operated Griffin Transportation Services, the largest international transportation service company in Nevada. Griffin held management positions with a major air carrier in San Francisco and several Silicon Valley firms in corporation transportation management and international trade before moving to Nevada in 1975.

Mr. Griffin has completed FEMA's Integrated Emergency Management Course and attended the Domestic Terrorism Executive Institute at Texas A&M University. Griffin served eight years as a board member of the U.S. Conference of Mayors serving on the Aviation Security Task Force and as the chair of the Public Safety and Criminal Justice Committee for five years.

A native of Boston, MA., he was named Public Official of the Year in 2001 by the Nevada League of Cities and served on the Crime Prevention Policy Committee for the National League of Cities.

For questions or further information about this article, please contact FEMA Region IX—Public Affairs, 510-627-7177, or web page: www.fema.gov/regions/IX/R9-nfip.shtm.



New FEMA Office

FEMA Region IX has moved to a new office location. Effective June 17, 2002, the new address is:

Check this out!



FEMA Region IX
1111 Broadway, Suite 1200
Oakland, California 94607-4052
office 510-627-7177
FAX 510-627-7147
Region IX NFIP Web page:
www.fema.gov/regions/IX/R9-nfip.shtm



New FMA Executive Director



Donna Bloom

*Newly appointed Executive
Director of the Floodplain
Management Association
(FMA)*

The Floodplain Management Association (FMA) recently selected a new Executive Director. Her name is Donna Bloom. Donna said, "The Floodplain Management Association is an excellent organization, and it is a great privilege to be given the opportunity to work for them. I would like to take this opportunity to let the members know that I'm looking forward to serving them, and I will do my best to meet their needs". Donna also serves as the Executive Director of the Nevada Water Resources Association (NWRA), and has been with the NWRA since October of 1997.

Donna is a graduate in business management from the University of Phoenix. She enjoys running, camping, hiking, snowboarding and boating. And in her "spare time" she coaches and manages youth football and softball teams.

Donna points out that the mission of FMA is to promote the common interest in reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. One of the goals to meet this mission is to expand FMA's outreach. An important outreach is FMA hosting throughout the year a variety of symposiums and workshops that focus on a broad range of floodplain topics. Donna says that because member input is so extremely important and a valuable catalyst for meeting this goal she urges you "to contact me and let me know what your interests are".

Mark your calendars for the FMA Annual Conference, "Trends and Innovations in Planning." The conference will be held at the Newport Beach Marriott in Newport Beach, California, September 10-12, 2003. Alan Solbert, Principal, Jones & Stokes is the Conference Technical Chair. The Conference Planning Committee is working hard to provide a strong program. Topics of discussion include habitat conservation plans (NCCP's), river and floodplain management issues i.e, damage assessments, structure inventories, etc., NFIP issues, watershed management planning, "No Adverse Impact" strategies, floodplain mapping and database management, and environmental restoration and flood damage reduction. Program information may be obtained from the FMA website at www.floodplain.org. This is an event you don't want to miss!

Please contact Donna at donna30@sprynet.com, or call 775/626-6389. She looks forward to hearing from you! FMA's new address is FMA P.O. Box 50891 Sparks, NV 89435-0891.



The Corps' Project Planning Process:

Six Steps to a Civil Works Project

By Steve Cowdin, Economist*
Sacramento & San Joaquin Rivers Comprehensive Study Team

Local agencies wishing to implement flood management projects may want to partner with the US Army Corps of Engineers so as to take advantage of its significant technical and financial resources. This may seem, however, like a formidable challenge. Understanding the Corps' procedures helps makes the process easier. This article summarizes the Corps' standard six steps process in the planning, design and implementation of civil works projects.

1. Problem Perception. Stakeholders within a local community perceive or experience water and related land resource problems (i.e., flooding, shore erosion, navigation restrictions, ecosystem degradation, etc.) which are beyond the local community's capabilities to resolve.

2. Request for Action. Local officials discuss problems with the Corps. Technical assistance and some small projects can be accomplished without Congressional authorization using the Continuing Authorities Program (a collection of authorities delegated by Congress to the Corps). If study authorization is required, local officials must contact a Congressional representative, who must then request study authorization through appropriate public works committees. If a Corps decision document was previously prepared for this area and associated problems, a Committee resolution can be adopted. However, if no Corps report exists, then Legislation will normally be required to authorize required studies.

3. The study is assigned to a Corps District. The Corps' South Pacific Division includes all of California and parts of Oregon, Nevada, Idaho, Utah, Colorado, Wyoming, Arizona, New Mexico and Texas. Districts within

California include Sacramento, Los Angeles, and San Francisco. Studies are conducted in two phases—reconnaissance and feasibility.

a. The primary objectives of *reconnaissance studies* are to determine if there is sufficient indication of Federal interest to warrant preparing a feasibility phase study, assess the potential for non-federal sponsors, prepare a Project Management Plan to guide feasibility level studies, and negotiate a Feasibility Cost Sharing Agreement. The reconnaissance study is federally funded and the target for completion is 6 to 12 months.

b. If the reconnaissance study is approved, the next step is the feasibility study. The objective of *feasibility studies* is to investigate and recommend solutions to water resource problems and to identify the level of Federal interest, i.e. is the investment warranted. The results of feasibility studies are documented in a feasibility report that includes documentation of federal and state environmental compliance. Feasibility studies are cost shared 50 percent federal and 50 percent non-federal. The non-federal share may be work-in-kind or cash. Feasibility studies should be completed within 18 to 36 months. The feasibility study is conducted under the US Water Resources Council's *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (March 10, 1983). Upon completion, the feasibility report undergoes independent technical review within the Corps before being submitted to the Division office for the first of many levels of review.

4. Report Review and Approval. The District office completes policy review of final feasibility reports and any accompanying environmental impact statements. After Division evaluation, the report is forwarded to Corps

*With valuable assistance from Craig Gaines and Alicia Kirchner, USACE Sacramento District, and Clark Frentzen, USACE South Pacific Division.

Headquarters (Chief of Engineers). The Chief of Engineers solicits and gathers comments on the feasibility report and environmental documentation, and prepares a final report that is submitted to the Secretary of the Army for review by the Assistant Secretary of the Army (Civil Works). The Office of Management and Budget comments on the report as it relates to the Administration's programs. The ASA (CW) then submits a Chief of Engineers report to Congress. During this review time, the Corps begins pre-construction engineering and design activities.

5. Congressional Authorization. Chief of Engineer's reports are referred to appropriate Congressional committees and, following committee hearings, projects are authorized by being included in a Water Resources Development Act, which typically are passed in even years.

6. Project Implementation. Authorized projects are placed in the President's budget and Congress appropriates the federal share of funds. A government representative—typically ASA (CW) or Corps District Commander for Continuing Authorities Projects—and the non-federal sponsors sign a Project Cooperation Agreement (PCA) once Congress has appropriated funds for the project. The cost share for projects is 65 percent federal and 35 percent by the local sponsors. At least 5 percent of the non-federal share must be in cash. As part of the PCA, non-federal sponsors are responsible for paying for land, easements, relocations, right of ways and disposal sites (LERRDS). However, if the LERRDS costs exceed 50% of the total project costs, then the federal government typically pays that portion of the LERRDS costs exceeding the 50% limit. Thus the non-federal share will be between 35 to 50 percent. This typically occurs in urban areas where land costs are high. After project construction, the non-federal sponsors are responsible for all operation, maintenance, repair, replacement and rehabilitation costs, with periodic Corps inspections.

The Corps is very interested in pursuing partnerships with state and local agencies and offers several technical and financial resources. Two of these resources include the Floodplain Management Services

(FPMS) and Planning Assistance to States/Tribes (PAS) Programs.

▲ **Floodplain Management Services.** The *Floodplain Management Services* Program is the Corps' means of using its technical expertise in floodplain management matters to help those outside the Corps, both federal and non-federal, to deal with floods and floodplain related matters. Section 206 of the Flood Control Act of 1960, as amended, provides the authority for this program. Upon request, and without charge, the Corps of Engineers will furnish to States, counties, and cities the floodplain information and technical assistance needed in planning for prudent use of land subject to flooding from streams, lakes, and oceans. Assistance is given within the limits of available appropriations, which have averaged around \$6.8 million annually over the last 5 years. Requests are also honored from non-water resource federal agencies and private persons on a fully reimbursable basis. More information on this program can be found at: <http://www.usace.army.mil/inet/functions/cw/cwfpms/fpms.htm>

▲ **Planning Assistance to States/Tribes:** Under this program, the Corps has authority to assist states, local governments, and other non-federal entities (including Indian Tribes) in the preparation of comprehensive plans for the "...development, utilization and conservation of water and related land resources." Typical studies are only at a planning level of detail and do not include detailed design for project construction. More information on this program can be found at: <http://www.usace.army.mil/inet/functions/cw/cwfpms/pas.htm>

Contact persons for the FPMS and PAS programs can be found at the South Pacific Division's website: www.spd.usace.army.mil/cwpm/public/plan/pdguide/spd/fpms_poc.htm.

Reflecting current trends in water resource and floodplain management planning, non-federal sponsors will be more successful if their proposed projects include multiple objectives rather than single purpose objectives. However, federal cost sharing may change depending upon the cost splits of the project alternatives. More information on the Corps'

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Awareness Floodplain Mapping Program

by Tom Christensen
DWR, Floodplain Management Branch

In just two years, the Department of Water Resources has taken a major step in improving the identification of flood prone areas within the State. The Federal Emergency Management Agency has mapped about 15,000 miles of streams in the State in the last 35 years through the National Flood Insurance Program. While this is vitally needed information, regrettably it does not include all of the flood hazards areas currently subject to development. As a result, flood prone areas have seen and will continue to see unintentional losses from flooding because of insufficient information regarding potential stream flooding not identified. It is estimated that about one-fourth of the State's 200,000 miles of stream systems will see some encroachment in the next 25 years. Detailed flood insurance studies are expensive and, resultantly, are limited in coverage. An alternative "look-ahead" solution is needed.

Awareness Floodplain Mapping is fulfilling this need. The floodplains provided under this program are approximate delineations for expected flooding and are considered as advisory floodplains, not regulatory floodplains. The intent is to provide a heads-up for development being considered in an area not yet assessed for any potential flooding. Any development in or near these flood prone areas will need a more detailed assessment as to the flood risks involved before proceeding. By May of 2003, approximately 12,000 miles of these Awareness Floodplains have been delineated. This leaves the State with over 20,000 miles to map within the next few years.

Communication with all of the State's communities is fundamental in the construction and use of these floodplains. Currently the State has met with all of the impacted counties and some of the major cities in the process of formalizing communication procedures for this mapping program

Awareness Floodplain Mapping Program, *continued from page 8*

and the use of the floodplain mapping product being produced. In addition, under contract to DWR, the URS Corporation has put together a GIS application for assigning and prioritizing new mapping requirements for Awareness Floodplains. This process takes into account all stream systems, current mapping status, community identified mapping needs, growth potential, proximity to population centers, proximity to transportation corridors, and the GAP Status (identification of areas having restricted growth area potential).

The Awareness Floodplain Mapping program provides a logical transition between the needs for expected development and the needs for protection from flood damage and loss of life that could otherwise occur. It provides an efficient and economical solution in determining potential detailed floodplain study needs and guidance in avoiding future flood damage and its impacts. Assessments have shown that the benefit-to-cost ratio for this program will be greater than 100 to 1. This program does not replace or supersede the National Flood Insurance Program. It simply reinforces it as it leads to identification of new flood prone areas requiring detailed flood plain studies for community planning, development, and growth.

Paper copies of each floodplain map are provided to each county once the initial study is completed and

has been reviewed by that county. This program will eventually include any incorporated community impacted by this mapping effort as appropriate. It should be noted that each of the completed floodplain maps would be expanded and/or revised as the needs are identified, pending available mapping funds. In addition to the paper copies of the Awareness Floodplains, the supporting metadata files and electronic files for each map are also provided for public use.

As the Awareness Floodplain Mapping review process is completed, the maps are made available on the Web. This also includes all of the supporting electronic files. The Web site for this information is:

<http://www.fpm.water.ca.gov/mapping.html>

As a final note, while it is not possible to eliminate the problem of flooding, it is possible to eliminate the problems induced by flooding. This is the focus of the Awareness Floodplain Mapping Program.

For questions or further information about this article, please contact Tom Christensen by email thomasc@water.ca.gov or by phone 916-574-0625.



The Corps Project, *continued from page 7*

planning process and programs can be found on the South Pacific Division's website (***<http://www.spd.usace.army.mil/>***) or on the Headquarters' website (***<http://www.usace.army.mil/>***). An excellent reference on the Corps' planning process is Engineering Regulation 1105-2-100 (April 22, 2002) which can be found on the website ***<http://www.usace.army.mil/publications/>***. For more information on the six steps described above, please obtain a copy of the Corps' Engineering Pamphlet "Six Steps to a Civil Works Project" (EP 1105-2-10, May 1990). Although outdated, this brochure is still useful.

(Ed Note: Future articles may review other Corps programs (such as the Continuing Authorities Program); the Federal Principles & Guidelines and the required economic evaluation procedures; and state guidelines for participating in local flood management projects.)

For questions or further information about this article, please contact Steve Cowdin by email scowdin@water.ca.gov or by phone 916-653-8166, or 916-557-7720.



A Port in the Storm

Flood Management & the National Flood Insurance Program

Adapted from an article by Julie N. Lynem, staff writer, San Francisco Chronicle, January 19, 2003

Buying insurance in California, or in the Nation for that matter, has been a confusing and often stormy passage. When the rainy season comes, homeowners, though, can take comfort in knowing there's one type of coverage that's not likely to leave them high and dry.

Flood insurance policies, backed by the federal government's National Flood Insurance Program, provide the coverage to ease concerns. National flood insurance typically isn't as troublesome as private insurance policies, industry officials say. "It's a stable and affordable program that's not subject to the same pressures as private homeowners insurance," said Omar Morales, spokesman with the Insurance Information Network of California. "And anyone can get it, including renters."

Congress, which renewed the flood insurance program early in 2003, created it in 1968 in response to the rising cost of taxpayer-funded flood disaster relief. The Federal Emergency Management Agency administers the program. Because flood insurance is tied to the federal government, there are no policy cancellations, nonrenewals or surcharges for filing previous or multiple claims. What's more, there are no inflated rates. Flood insurance premiums are the same regardless of which insurance carrier writes the policy.

The owner of a \$ 100,000 single-family home, for example, could pay annual premiums ranging from about \$400 to \$ 1,000 for a standard policy. Premiums vary according to the amount of coverage, the deductible, when the property was built and which flood zone the property happens to be in. A maximum of \$250,000 of building coverage is available for single-family residential buildings. "You don't need to shop around for your policy," said Joann Beyer, program specialist with the National Flood Insurance Program. "If you go to two agents and get two different prices, then somebody rated it wrong."

Indeed, purchasing flood insurance should be a straightforward process for homeowners, condominium and apartment dwellers. Any licensed insurance agent can write a policy for residents living in a community participating in the national program.

Policies take 30 days to go into effect. Exceptions are made if the insurance is required for the closing of a loan, or if there was a flood map change. Dozens of insurance companies across the country, including major carriers like State Farm, Allstate, Travelers and Farmers Insurance, issue flood policies under an arrangement with the flood insurance program. Although flood insurance is widely available, many residents who aren't required to buy it as a condition of securing a home loan choose not to. "When people buy homeowners insurance, they don't expect their home to be burned, robbed or vandalized," Beyer said. "But they still buy that policy because it could happen." As of August, 2002 there were 283,418 flood policies in force in California. There are 8 million homeowners insurance policies in force in the state.

"If you go to two agents and get two different prices, then somebody rated it wrong."

*Joann Beyer,
program specialist,
National Flood Insurance Program*

Flood insurance is mandatory only for homes, condos, apartments and commercial buildings located in flood zones that have the greatest risk of flooding. Federally regulated lenders require flood insurance to make, extend, increase or

(Flood Management & the NFIP)

renew any loan for buildings in a special flood area. Homeowners outside these special flood hazard areas do not have to purchase flood insurance. Also, insurance is not mandatory for homes that are paid off.

Even if a home isn't in a flood zone, property owners shouldn't assume they're protected. Roughly 30 percent of all claims come from outside the special flood hazard areas. Insurance experts also warn residents not to count on federal disaster aid, which is paid out in the form of a low-interest loan. Less than half of all floods are declared disasters by the president. Another common fallacy is thinking that homeowners insurance will cover flood damage, industry officials say. Such insurance provides limited coverage for water damage. Examples include damage from a broken pipe or backed-up toilet.

A flood is defined as surface water from any source that would affect your property and one other property. Flood insurance also covers damage caused by mudslides and mudflow. A more comprehensive definition of flood can be found on the National Flood Insurance Program Web site at www.fema.gov/nfip.

"In today's tighter insurance market, it's important that consumers understand their coverage more than ever," said Morales of the Insurance Information Network of California. "A wrong assumption can end up costing you thousands."

For questions or further information about this article, please contact Edie Lohmann by email lohmannnfip@hotmail.com or by phone 916-780-7889.

An Ounce of Prevention...

There are several steps homeowners can take to prevent flood damage:

Make sure electric switches, electrical appliances, furnaces and water heaters are located above expected floodwater elevations.

Get a licensed plumber to install a sewer back-flow valve. Build drainage systems around your property.

Seal openings such as low windows and build exterior floodwalls around basement doors and window wells.

Improve exterior walls, elevate buildings above projected flood levels and relocate buildings away from floodplains.

Know your flood risk. Ask to see a flood map of your community.

Make sure you have enough flood insurance. Homeowner policies do not cover flood damage, so you may need to purchase a separate flood policy under the National Flood Insurance Program.

To find an agent in your area, call the Federal Emergency Management Agency at (888) 379-9776.



Lessons from History

Geological Insights into the Magnitude and Frequency of Floods

By P. Kyle House, Ph.D., Research Geologist
Nevada Bureau of Mines and Geology
University of Nevada Reno, NV 89557

Floods happen often. The repeated occurrence of floods over human and geological time scales has contributed immensely to the habitability of the planet—from the fundamental role it has in replenishing floodplain soils in agricultural areas to the production of landscapes that are well suited to human habitation and urban development. Habitation by modern people, however, has repeatedly befallen the fate of flood inundation despite decades of modern engineering analysis and flood-control strategies. This lack of progress has several causes, but the most important is probably related to our society's tendency to embrace the mathematical rigor of engineering analysis over the rational and easily understandable elegance of geologic evidence.

Consider the following statements:

Mathematical rigor: “Our hydraulic model predicts that you are within the boundaries of the 1% chance inundation limits associated with the discharge predicted by our hydrologic model”

Geological reasoning: “Geologic evidence indicates that your property has not been inundated by floodwaters in more than 1000 years”.

In the U.S., the cultural and institutional response to floods is rooted in engineering and regulation, and the leading statement above best represents the status quo. The notion of the so-called 100-year flood is so deeply ingrained in the collective American psyche as to be nearly meaningless. This is not a bad development, however, and it may help to usher in a new paradigm of flood control and hazard mitigation that incorporates geologic information. The concept of the 100-year flood is neither particularly useful nor particularly meaningful. Its calculation depends on a set of assumptions about the occurrence of natural processes that are difficult to test with confidence. Few rivers, streams, or washes have lengths of record even approaching 100 years—a problem for

developing a representative sample of events, and the explanation for why 100-year flood designations change with the occurrence of every large flood. Moreover, change and variability in climate over decades to centuries can have major influence on the size and frequency of floods in any given 25, 50, or 100-year period, further impairing the value of short or discontinuous records. Floods are also hard to measure. Most stream gages in the US function best while measuring low to moderate flows and are often overwhelmed or destroyed by large floods.

In the interest of pragmatism, it is certainly essential that a standard set of procedures be in place and widely agreed upon, hence the “100-year flood”. But the standards also need to be well founded in physical reality. The overall failure in the status quo is evident in the dual increase of the costs of flood damage and expenditures on flood control over the last several decades. As a geologist, I argue that the best set of standards involves integration of geologic information that directly reflects the occurrence of floods over time with conventional hydrologic/engineering methods. In this pairing, geologic evidence should serve as the basis for testing the engineering methods/models. Models that depart from reality need to be reformulated.

Paleoflood hydrology offers a case in point. Paleoflood hydrology is a multi-disciplinary technique that combines hydrology, hydraulics, and geology to exploit stratigraphic and geomorphic records of floods for application to augmenting flood frequency analysis and flood risk assessment. The focus of paleoflood hydrology is the determination of the magnitude and frequency of large floods that occurred prior to, or in absence of, human observation or documentation. In this sense, paleoflood hydrology provides the only opportunity to extend flood records in real time from the basis of physical evidence of large floods.

Paleoflood studies are most well suited to reaches of rivers and streams that are bedrock-controlled and in semi-arid to arid regions. These factors enhance the long-term preservation of geologic evidence of flooding in a geometric arrangement that is stable over periods of several 1000s of years. Recent methodological developments have successfully transferred the techniques to humid settings. Traditionally, paleoflood hydrology relies on slackwater flood deposits—layers of fine-grained sediments (sand and silt) that accumulate in protected areas of reduced flow velocity during large floods. Typical deposits accumulate on the lee side of channel obstructions, in tributary mouths, and channel flanks in areas where channels abruptly expand or contract. In stable channels, vertical and laterally inset stacks of slackwater flood deposits are natural stream gages that can be tapped for valuable information using standard techniques of stratigraphic analysis. Individual flood strata record the minimum stage of the flood that emplaced them.

Hydraulic models are used to develop a rating curve for stratigraphic sequences of flood deposits in bedrock canyons. One-dimensional models (e.g. HEC-RAS) are most commonly used for the sake of convenience, but more complex 2-dimensional flow models are now seeing increasing application. Sequences of flood deposits can be age-dated using archeological methods, radiometric dating (carbon-14), or even using dendrochronology (ring-counts of trees rooted in deposits). Many paleoflood chronologies in the Southwest span several 1000s of years, so radiometric dating of deposits is the most common technique.

Stratigraphic evidence for floods can be combined with evidence for flood non-occurrence over time to constrain maximum flood magnitudes. This approach is called the paleohydrologic bound method, and it is based on the simple reasoning that an undisturbed, unconsolidated geologic feature of a known age in a hydraulically vulnerable setting indicates the non-occurrence of a flood large enough to remove the feature (a soil, or other geologic deposit) over that period of time. This is similar to a common and simple application of geology to seismic-risk assessment where an un-faulted geologic deposit of a known age is evidence for the lack of a surface-faulting event at that site over that time.

(continued on page 14)

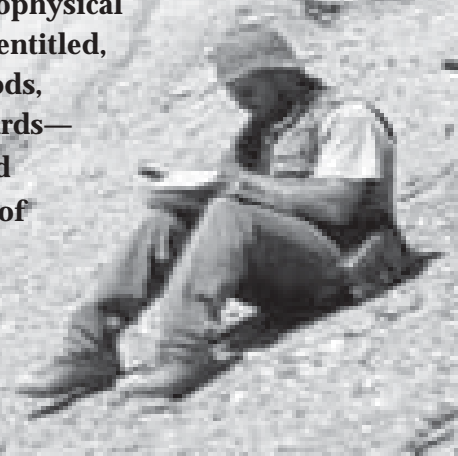
Dr. Kyle House

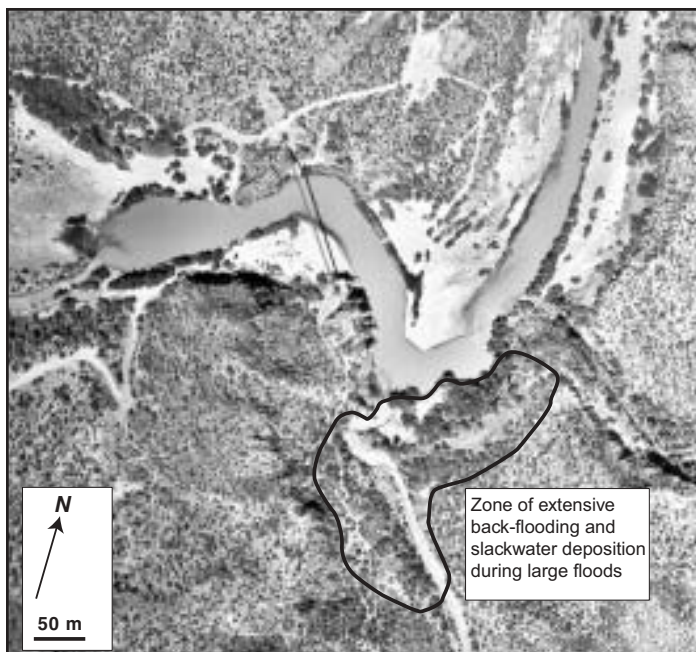
Dr. Kyle House is a Research Geologist at the Nevada Bureau of Mines and Geology, University of Nevada, Reno. He specializes in Quaternary Geology and Paleohydrology with emphasis on using geological information to understand flood magnitude and frequency over time scales well in excess of conventional records.

Dr. House has BS and BA degrees from Western Washington University in Geology and Geography, respectively. He has MS and PhD degrees in Geosciences from the University of Arizona. Kyle has 14 years of experience mapping, analyzing, and communicating the Quaternary geology of the southwestern US and how it relates to climatic variability and the magnitude and frequency of extreme floods on rivers, streams, and alluvial fans.

Most recently, his research has emphasized unraveling the flood history of rivers and alluvial fans in Nevada. Currently, he is leading a project of geologic mapping and flood hazard assessment of desert piedmont areas in Ivanpah Valley, Nevada. Other recent research interests include the Late Quaternary History of the Humboldt River, the Truckee River, and the late Tertiary and Quaternary stratigraphic record of the inception and evolution of the lower Colorado River near Laughlin, Nevada.

Dr. House is the lead editor of a book recently published by the American Geophysical Union (2002) entitled, “Ancient Floods, Modern Hazards—Principles and Applications of Paleoflood Hydrology”.



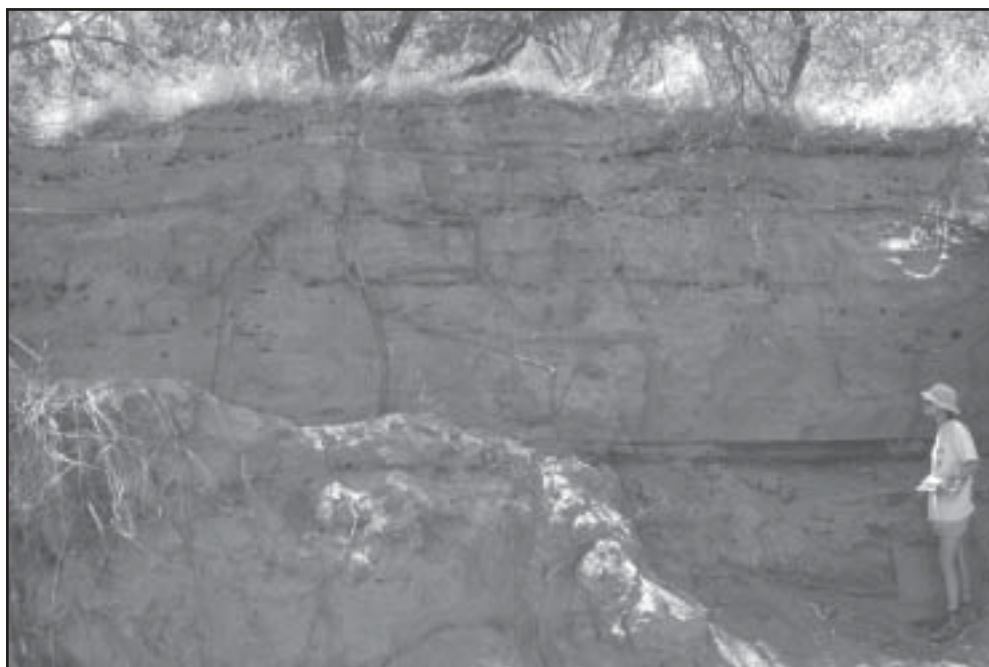


The combination of slackwater deposit paleoflood hydrology and non-exceedance paleohydrology provides for a robust characterization of the flood history and flood potential of a given river. It also helps to transfer the method to sites in humid settings. In general, sites conducive to one or both of these types of paleoflood analysis can be found on almost any river, but some settings are less amenable to analysis. For example, alluvial rivers and rivers strongly affected by regulation and anthropogenic modification (e.g. hydraulic mining) may have recent histories so complicated as to obscure or obliterate relevant geologic evidence. Even the occurrence of a spectacularly large flood may remove geologic evidence of past floods, although there are often geologic opportunities to place such extreme events into a long-term context by evaluating the ages of the oldest deposits or landforms affected by the flood.

(continued on page 15)

Figure 1. Aerial photograph of an ideal paleoflood study site—Lower Verde River, Arizona. Flow is to the left. In this reach floodwaters back-up behind the bedrock constriction and set up a large eddy in the mouth of the tributary. During large floods, tremendous amounts of sediment are deposited in the tributary mouth. A paleoflood record spanning 1300 years is preserved at this site. A record flood occurred here in the winter of 1993, but evidence for larger floods is clearly discernible in the paleoflood record.

Figure 2. Photograph of the lower part of a thick sequence of slackwater flood deposits in the mouth of the tributary shown in the previous figure. This is one of four stacks of flood deposits at this site that reach a composite thickness of 9 meters and span 1300 years.



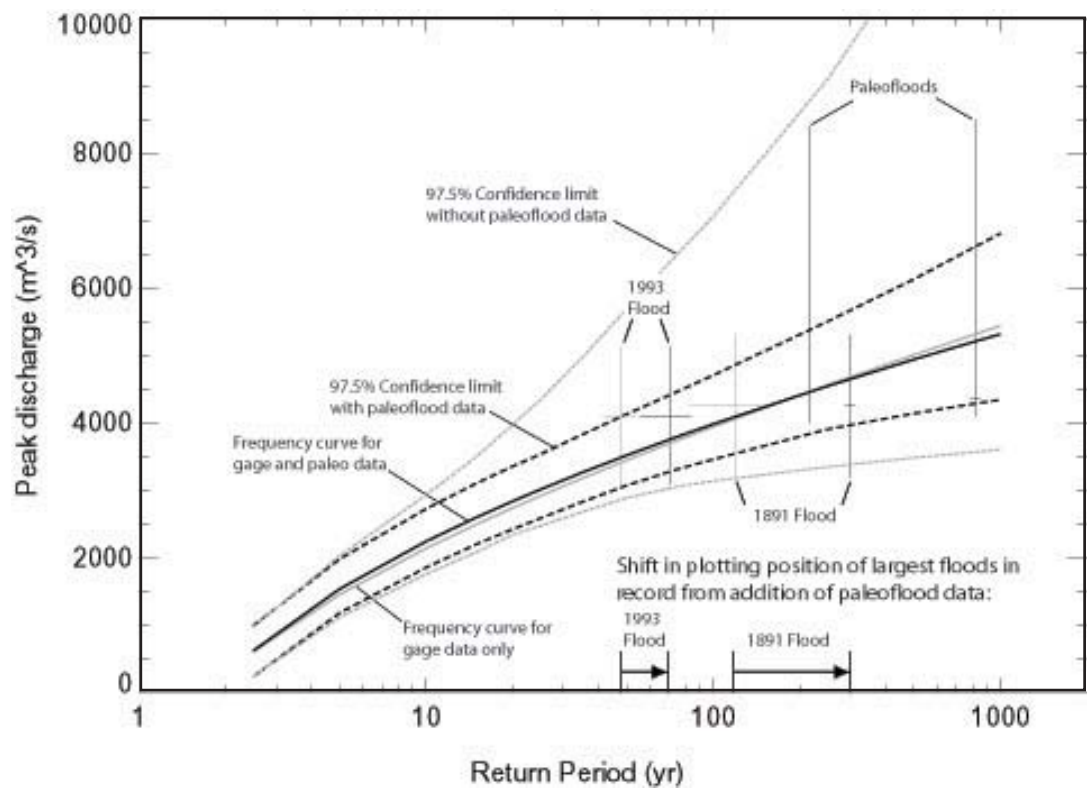
Lessons from History *(continued from page 14)*

The most obvious benefit of paleoflood information is the extension of flood records in real time by 100s to 1000s of years. Establishing the long-term context of a short record provides an otherwise unattainable perspective on the context of seemingly anomalous large floods. This enhanced perspective is more than a qualitative one. Recent developments in flood-frequency modeling allow for the explicit inclusion of paleoflood data and their related uncertainties into an otherwise conventional statistical framework that is appropriate for flood risk assessment. Many of the advances in statistical frequency modeling with paleoflood data have been made in dam safety studies by the U.S. Bureau of Reclamation. These developments are a critical step towards integrating geologic data into conventional flood hazard assessments.

Paleoflood hydrology is but one contribution that geology can make to improve flood control planning and flood hazard mitigation. Another major contribution lies in the realm of surficial geologic mapping and delineation of flood-hazardous areas on desert piedmonts. This application has recently been recognized outside of the geological community (i.e. by FEMA) as an important component of flood-control planning. The explicit incorporation of geological information into the traditionally engineering realm of regulatory flood hazard studies can only improve the scientific basis of flood control planning and hazard mitigation. Presently, improved communication of philosophies, ideas, and practical needs among geologists and engineers is the most important step towards this goal.

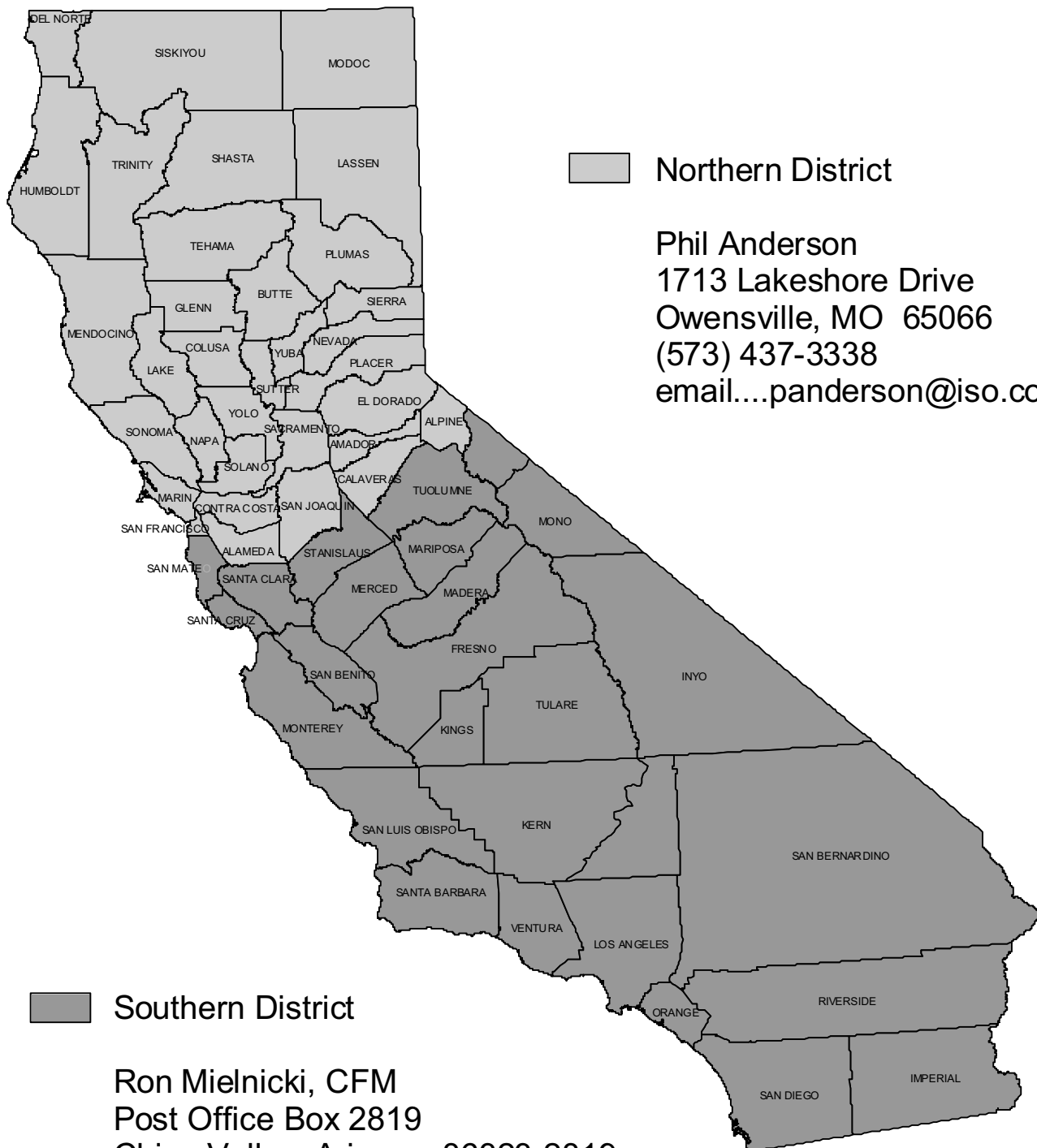
For questions or further information about this article, please contact Kyle House, PhD, by email khouse@unr.edu or by phone 775-784-6691.

Figure 3. Flood frequency curves and plotting positions for the lower Verde River flood record using gage data alone and gage data plus 2 paleofloods. The principal differences include a significant reduction in the statistical uncertainty (dashed lines flanking the curves) and a shift in the plotting position of two largest floods in the record flood (1891 and 1993). Addition of the paleoflood information bolsters the long-term context for those large floods and indicates that they are less frequent occurrences than analysis of the gage record alone predicts. Error bars on each point reflect uncertainties in discharge estimates.



Insurance Services Office

Community Rating System



CRS Nationwide Communities by Class

Classes Effective October 1, 2002

(includes total from previous two effective dates)

***CRS
Class***

Number of Communities per Class

Oct. 2001

May 2002

Oct. 2002

May 2003

3	1	1	1	1 (Tulsa, OK)
4	2	2	2	2 (Fort Collins, CO) (King County, WA)
5	12	14	19	19
6	33	33	44	46
7	134	143	161	170
8	362	367	370	381
9	394	388	362	359

***Total
Number of
Communities***

938

948

959

978

December 26, 2002

Cooperative Technical Partners

CTP's To the Rescue

By Ray Lenaburg, FEMA, Region IX

With over 19,000 communities participating in the National Flood Insurance Program (NFIP), it is a major challenge for FEMA to keep flood hazard identification maps up to date. The Cooperative Technical Partners (CTP) Program is an innovative approach to creating partnerships between FEMA and participating NFIP communities, regional agencies, and State agencies that have an interest in and capacity to become more active participants in the FEMA Flood Hazard Mapping Program. Entering into an agreement with FEMA is a way to formalize the local contribution and commitment to flood mapping. This helps FEMA to ensure that official flood maps are accurate, up-to-date, and reflect local flood information and conditions.

The CTP partnership helps maximize limited funding by combining resources. By aligning objectives of FEMA and the CTP partner, national standards are maintained consistent with NFIP regulations and objectives.

There are additional advantages. Flood maps are more accurate and updated faster. Hazard identification and risk management—the basic building blocks of a disaster-resistant community—are improved. Shared “BEST PRACTICES” provide greater effectiveness and efficiency in flood mapping and floodplain management.

FEMA training, technical assistance, and mentoring will assist already capable communities to further meet FEMA standards and improve local mapping. As a Cooperating Technical Partner a number of activities can be accomplished.

- Refinement of approximate Zone A floodplain boundaries.
- Hydrologic and Hydraulic (H&H) modeling and mapping.
- Digital FIRM preparation and/or maintenance.

- Redelineation of floodplains using updated topographic data.
- Analysis of community mapping needs.
- Inventory of available base maps.
- Digital base map data sharing.
- Digital topographic data development.

FEMA is seeking qualified Partners to collaborate in improving and maintaining up-to-date flood hazard identification maps and other flood hazard information. Following are the steps to become a CTP.

1. Contact the CTP coordinator at your FEMA Regional Office. In Region IX, contact Ray Lenaburg 510-627-7181, or email **raymond.lenaburg@dhs.gov**
2. Enter into a Partnership Agreement.
3. Identify mapping activities.
4. Coordinate with FEMA on scope of activities and products.
5. Determine partners' and FEMA's responsibilities and contributions.
6. Initiate mapping activities.
7. Review process annually.

Get more information on-line at **http://www.fema.gov/mit/tsd/ctp_main.htm** or call the FEMA Map Assistance Center at 1-877-FEMA-MAP (336-2627).

For questions or further information about this article, please contact Ray Lenaburg by email raymond.lenaburg@dhs.gov or by phone 510-627-7181.



National Flood Insurance Program

Repays All Borrowed Funds – With interest

By Henry Chau, FEMA, Region IX

The National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA), borrowed a total of \$650 million to help cover the approximately \$1.1 billion in claims from the 2001 Tropical Storm Allison, the most expensive flood event in the 34-year history of the NFIP. The debt, including interest on all monies borrowed from the U.S. Treasury, was repaid and the debt reduced to zero in late 2002 with a final payment of \$10 million.

“I am proud that FEMA can meet its goal of minimizing the suffering and disruption of disasters through the flood insurance program at no cost to the taxpayers,” former FEMA Director Joe M. Allbaugh said.

Anthony S. Lowe, administrator of FEMA’s Federal Insurance and Mitigation Administration, emphasized that borrowing is an anticipated, expected and standard procedure within the structure of the NFIP.

“Congress provided the NFIP with a borrowing authority because it recognized that floods occur irregularly and that several in rapid succession—not to mention a storm of the magnitude of Allison—might require cash reserves,” he said. “Later, when heavy flood losses return to average or below-average levels, funds borrowed from the Treasury are paid back, with interest, from premium income.”

Lowe explained that flood insurance rates are based on anticipated claims over the long term. During certain periods, however, premium income—currently \$4 million per day—may need to be supplemented to cover claims in the aftermath of severe storms, as has happened several times in recent years.

The timing and severity of floods determine whether or not the NFIP needs to borrow funds and how quickly borrowed funds can be repaid. A previous round of borrowing followed several major flood

disasters beginning with the Louisiana Floods of 1995, which alone resulted in flood insurance claims totaling nearly \$584 million. All borrowed funds had been repaid by the end of June 2001, the month that Tropical Storm Allison struck the U.S.

Since 1986, the NFIP has used no funds appropriated from general revenue, instead paying nearly \$9.5 billion in claims and more than \$5.4 billion in program expenses from policyholder premiums and investment income. The period from 1986 to 1991 was relatively light in terms of flood losses, which allowed the accumulation of premiums. The heavy loss years 1993-1997 depleted those funds and necessitated borrowing from the U.S. Treasury. Indeed, claims from this period alone represented nearly 50 percent of the total paid losses in the program’s history. Later, however, relatively light losses from 1998 through the first half of 2001 enabled the NFIP to repay the borrowed funds.

The NFIP makes federally backed flood insurance available to homeowners, renters and business owners in communities that adopt and enforce floodplain management ordinances designed to reduce future flood losses by regulating new construction. Currently, nearly 4.4 million policies are in force in approximately 20,000 participating communities, representing nearly \$618 billion worth of coverage. It is estimated that NFIP building standards prevent approximately \$1 billion in flood damage annually.

FEMA News Release No. 02-200
Washington DC
November 1, 2002

For questions or further information about this article, please contact Henry Chau by email henry.chau@dhs.gov or by phone 510-627-7182.



What's New In Hazard Mitigation

By Jerry Bare*

DWR, Floodplain Assistance Section

Over the past 12 years, federal disaster assistance costs have totaled more than \$39 billion (in fiscal year 2001 dollars) as a result of a series of unusually large and frequent disasters and an increasing federal role in assisting communities and individuals affected by disasters. This commitment to federal disaster assistance is continuing, as \$4 billion in disaster assistance costs are expected for fiscal year 2002, in part due to the September 11, 2001 terrorist attacks and their impact.

The Federal Emergency Management Agency (FEMA), the lead agency for providing federal disaster relief, has provided the bulk of the assistance to help those in need respond to and recover from disasters. As the costs for disaster assistance have risen, FEMA has made disaster mitigation a primary goal in its efforts to reduce the long-term cost of disasters and has developed mitigation programs designed to minimize risk to property or individuals from natural or man-made hazards. These mitigation programs differ substantially in how they have sought to reduce the risks from hazard but each program has features that the State emergency management community believes have been successful for mitigation.

Public Assistance Program. This program provides assistance to State and local communities for debris removal, emergency protective measures, and restoration or replacement of damaged public facilities during a federally declared disaster. Certain non-profit organizations may also qualify for Public Assistance. Public Assistance may cost share up to 75% of the eligible costs. Fifteen percent of Public Assistance awards may go to mitigation efforts.

Hazard Mitigation Grant Program (HMGP). This post-disaster program assists State and local governments in implementing long-term mitigation measures following a federally declared disaster. The primary objectives of HMGP are to prevent future loss of lives and property; to implement State or local hazard mitigation plans; to expedite the implementation of hazard mitigation plans; and to

provide funding for pre-identified mitigation measures within the disaster area. HMGP projects are cost shared 75% federal, 25% non-federal.

Examples of flood related HMGP projects are: elevation of floodplain buildings, dry floodproofing of nonresidential buildings, acquisition of property and demolition of buildings resulting in open space areas, minor structural flood control projects, relocation of buildings, beach nourishment activities, and vegetation management/soil stabilization.

Flood Mitigation Assistance (FMA) Program. This grant program (also cost shared 75% federal, 25% non-federal) has the goal of funding cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other properties that are insured under the National Flood Insurance Program before a major disaster occurs. Each year, local communities will be eligible to receive two types of cost-shared FMA grants. Planning Grants are awarded to assist State agencies and local governments in developing or updating floodplain management plans that assess flood hazard risks and propose possible mitigation actions to reduce the risks. Project Grants are awarded to assist State agencies and local governments in implementing flood mitigation projects that will reduce the risk of flood damage to repetitive loss properties that have been identified in a floodplain management plan. (A repetitive loss property is defined as any insured property that has sustained two or more flood losses of at least \$1,000 in any 10-year period.)

A community has two years to develop a plan and then three years to complete the project. No extensions are granted. Eligible communities may apply for up to \$50,000 in FMA Planning Grants every 5 years. The total Planning Grants made in any fiscal year to any State, including all communities located in the State, must not exceed \$300,000. Project Grants money during any 5-year period may not exceed \$10 million to any State or \$3.3 million to any eligible community while the total Project Grants

in any fiscal year during the 5-year period may not exceed \$20 million. States are encouraged to focus the use of their planning and project funds to assist communities with a significant amount of repetitive loss structures.

New Pre-Disaster Mitigation (PDM) Program. This program was established and authorized by the Disaster Mitigation Act of 2000. PDM assists States and local communities to become disaster resistant by identifying hazards and proposing mitigation measures that reduce risk.

Both Planning and Project grants will be available to the States and local communities. The performance period will be a maximum of 24 months for planning sub-grants and 36 months for project sub-grants. Communities must develop multi-hazard mitigation plans to be eligible to receive project grants. For planning sub-grants, a draft plan must be submitted for review to FEMA within 18 months, and final plans must be submitted to FEMA within 24 months. For mitigation project sub-grants, a design and construction contract must be completed within 12 months of grant award so that work can be completed during the second 24 months. FEMA has developed rules and regulations, for project grants and planning grants associated with the PDM program. These regulations are listed in the Federal Register, Vol. 68, No. 129. For fiscal year 2003, PDM planning and project grants are due to FEMA by October 6, 2003. For FY03, communities are not required to have completed a PDM multi-hazard plan, but for FY04 FEMA approved PDM multi-hazard plans will be required.

National Flood Insurance Program (NFIP). This program is based on an agreement between local communities and the federal government. If a community is willing to implement floodplain management measures that reduce future flood risks to homes and businesses, the federal government will make flood insurance available within that community.

If floods damage a home or business that is covered by a flood insurance policy, the NFIP may require the owner to meet certain building requirements to reduce future flood damage. To help meet the costs associated with bringing the home or business into compliance, the **Increased Cost of Compliance (ICC)**, coverage of the flood insurance policy, provides up to \$20,000 for restoration, elevation or relocation. Effective May 1, 2003, the Federal Insurance and Mitigation Administration of FEMA will increase the limit of ICC from \$20,000 to \$30,000 with no change in premium.

Community Assistance Program (CAP). This program is a financial assistance program that directly supports the flood loss reduction objectives of the NFIP. About \$5 million is allocated each year to States and territories to provide assistance to communities that participate in the NFIP through the performance of community assistance visits and NFIP workshops. The program identifies, resolves, and even prevents floodplain management problems before they require enforcement action. States have used CAP funds to update recorded inventories of historical and currently insured repetitive loss structures, provide technical assistance to communities, offer training and workshops for communities, encourage participation in the NFIP, and promote communication of mitigation success stories.

In California, the Governor's Office of Emergency Services administers the Public Assistance Program, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, and Pre-Disaster Mitigation Program. The Department of Water Resources administers the National Flood Insurance Program and the Community Assistance Program and is willing to work with communities to develop cost effective flood hazard mitigation projects and plans.

For questions or further information about this article, please contact Marcia Rentschler of OES by email Marcia_rentschler@OES.ca.gov or phone 916-845-8170; or Jerry Bare by email jbare@water.ca.gov or phone 916-574-0624.

No Adverse Impact – ASFPM Gives Support

By Bill Hom, Chief
DWR Floodplain Assistance Section

At its April 3, 2002 meeting, the Board of Directors of the Association of State Floodplain Managers (ASFPM) adopted a resolution in support of the principle of “no adverse impact” (or NAI) floodplain management.

NAI floodplain management is about local communities being proactive in understanding potential impacts and implementing programs of mitigation before adverse impacts occur. NAI is an approach that will lead to reduced flood losses throughout the nation while promoting and rewarding strong management and mitigation actions at the local level.

According to ASFPM, NAI is a managing principle that is easy to communicate, and from a policy perspective is tough to challenge. Under an NAI framework, the action of one property owner is not allowed to adversely affect the flood risks for other property owners, as measured by increased flood peaks, flood stage, flood velocity, flood flows, and the potential for erosion and sedimentation, unless community-approved mitigation occurs. No adverse impact floodplains would become the default management criteria, unless a community has developed and adopted a comprehensive river plan that identifies acceptable levels of impact, specifies appropriate measures to mitigate those adverse impacts, and carries out a plan for implementation. NAI could be extended to entire watersheds as a

means to promote the use of retention and detention technologies to mitigate increased runoff from urban areas.

Help for NAI is available to California communities from the FPM Branch staff and the NFIP Coordinator by providing technical assistance and mapping; by project reviews and comments; and by advising on hazard mitigation alternatives. Another form of assistance is a high-water-marking program initiated after significant floods. Staking the high water mark delineates areas of flooding and defines water surface profiles. This helps residents and local officials to visualize the flood risk related to well-known local streets and landmarks.

ASFPM sponsors presentations about the No Adverse Impact approach. A training session was presented at the ASFPM 27th Annual Conference in St. Louis, Missouri, May 11-16, 2003. They are also undertaking legal research to produce a report on the legal aspects of No Adverse Impact. For more information, contact ASFPM at (608) 274-0123, or asfpm@floods.org. Full copies of the ASFPM documents on flood policy, including a published article on No Adverse Impact, can be downloaded at www.floods.org.

For questions or further information about this article, please contact Bill Hom by email billh@water.ca.gov or by phone 916-574-0633.



Definitions

Mitigation

Mitigation refers to activities that lessen the potential for future damage. Mitigation can be undertaken by a homeowner, by a community, or by the Federal government. Examples of flood hazard mitigation are elevating a structure above the predicted flood level, constructing retention basins to enhance the natural flood storage of a floodplain, and updating floodplain ordinances to reflect the most recent flood data.

Floodplain

According to the NFIP *Flood Insurance Manual*, a floodplain is: “Any land area susceptible to being inundated by flood waters from any source.” A floodplain stores and transports flood waters. Floodplains are dynamic—today’s floodplain may not always be the same. Man’s development, and nature’s weathering are two of many ways a floodplain may change.



Getting in Touch . . .

The ***Golden State Floodlight***, the State of California's Floodplain Management newsletter, is a publication of the Department of Water Resources; managing editor, A. Jean Brown; layout and graphics by DWR Graphic Design. Material for publication is solicited from federal, state, regional and local entities whose work is relevant to floodplain management issues.

The purpose of this newsletter is to assist local communities in managing their floodplains and in meeting the Federal Emergency Management Agency requirements under the National Flood Insurance Program. This *free* publication is supported under a cooperative agreement with FEMA.

Readers are encouraged to submit reports or draft articles about their experiences with the administration and management of floodplains, the effects or prevention of flood, flooding and cleanup, public education or outreach efforts, or in related fields such as wetlands, storm water management, etc. Relevant photos, black and white or color, are especially welcome. Text or photos will *not* be returned unless specifically requested. Address material for publication to:

Ricardo S. Pineda, PE, CFM
California Department of Water Resources
3310 El Camino Avenue
Room LL60
Sacramento, CA 95821
FAX: 916-574-0678

Copies of the ***Floodlight*** are available to schools, libraries and interested individuals, as well as local community officials, professional floodplain managers and staff, and professionals in various related fields such as wetlands, the environment, water engineering, etc. To add new names and addresses; to change or correct mailing labels (please include ID number); or for additional copies to the same location, please contact Bill Hom by email, billh@water.ca.gov or at the office address listed above.

Questions regarding 'by-lined' or attributed articles should be directed to the author or source listed with the article. Technical questions or discussions or issues should be addressed to the appropriate District floodplain management specialist:

Northern District: Kris Kingsley
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Golden State Floodlight

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California Floodplain Management Newsletter

A publication of the California Department of Water Resources

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